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MIL-STD-398 ACCEPTANCE TEST OF
AMMUNITION PECULIAR EQUIPMENT (APE)
1974E002
CONTINUITY KIT FOR M76 GRENADE

91-15870



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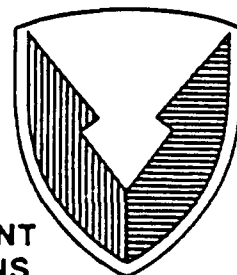
U.S. Army Defense Ammunition

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<p>The U.S. Army Defense Ammunition Center and School (USADACS), Evaluation Division (SMCAC-DEV), was tasked by the Equipment Division (SMCAC-DEN) to test the Ammunition Peculiar Equipment (APE) 1974E002 Continuity Kit For M76 Grenade to MIL-STD-398, Military Standard Shields, Operational for Ammunition Operations, Criteria for Design of and Tests for Acceptance. The APE 1974E002 was tested in accordance with Test Plan for Ammunition Equipment 1974E002 Continuity Kit for M76 Grenade prepared by the Equipment Division and approved by U.S. Army Materiel Command Field Safety Activity (AMCFSA), Charlestown, IN. The test plan defines the Maximum Credible Incident (MCI) expected when the Grenade, Launcher, Smoke, IR Screening, M76 is functioned in the APE 1974E002. Functioning of this device is for test purposes only and not part of normal operations for continuity testing the grenade. Thermal flux or blast overpressure amplitudes were too low to record.</p>					
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REPORT NO. EVT 33-89

MIL-STD-398 ACCEPTANCE TEST OF

AMMUNITION PECULIAR EQUIPMENT (APE) 1974E002

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PART 1

INTRODUCTION

A. BACKGROUND. The U.S. Army Defense Ammunition Center and School (USADACS), Evaluation Division (SMCAC-DEV), was tasked by the Equipment Division (SMCAC-DEN) to test the Ammunition Peculiar Equipment (APE) 1974E002 Continuity Kit For M76 Grenade to MIL-STD-398, Military Standard Shields, Operational for Ammunition Operations, Criteria for Design of and Tests for Acceptance. The APE 1974E002 was tested in accordance with Test Plan for Ammunition Equipment 1974E002 Continuity Kit for M76 Grenade prepared by the Equipment Division and approved by AMCFSa, Charlestown, IN. The test plan defines the MCI expected when the Grenade, Launcher, Smoke, IR Screening, M76 is functioned in the APE 1974E002. Functioning of this device is for test purposes only and not part of normal operations for continuity testing the grenade.

B. AUTHORITY. This test was conducted in accordance with mission responsibilities delegated by the U.S. Army Armament, Munitions and Chemical Command (AMCCOM), Rock Island, IL 61299-6000. Reference is made to AR-700, 15 April 1979, DARCOM Suppl 1, 4 September 1979; and AMCCOMR 10-17, 13 January 1986, Mission and Major Functions of U.S. Army Defense Ammunition Center and School.

C. OBJECTIVE. The objective of this acceptance test was to determine if the APE 1974E002 satisfied the test requirements of Test Plan for APE 1974E002 Continuity Kit For M76 Grenade and MIL-STD-398, Military Standard Shields, Operational for Ammunition Operations, Criteria for Design of and Tests for Acceptance.

D. CONCLUSIONS. The APE 1974E002, as tested by continuity testing eight grenades and functioning two grenades with a 25 percent black powder

overcharge. The APE 1974E002, as tested, provides operator protection from a functioning M76 grenade when the electric match, launch propellant, and the 25 percent powder overcharge of the grenade function.

E. RECOMMENDATIONS. It is recommended that this configuration of the APE 1974E002 be approved for field use when testing the M76 grenade. If items with larger amounts of explosive in the powder train are to be tested in the APE 1974E002, the fixture must be tested to that level of explosive, plus the 25 percent overload.

PART 2

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PART 3

TEST PROCEDURES

DETAILED REQUIREMENTS

100 Class- Blast Attenuation Tests

200 Class - Fragmentation Confinement Tests

300 Class - Thermal Effects Attenuation Tests

CLASS-100 BLAST ATTENUATION TESTS

METHOD 101

BLAST OVERPRESSURE MEASUREMENT

1. PURPOSE

a. Measurement of blast overpressure is conducted to ensure that personnel are not exposed to peak positive incident overpressure greater than 2.3 psi, when the operational shield is subjected to a MCI.

b. An acceptable alternative to measuring peak positive incident overpressure is to measure peak positive normal reflected overpressure. Personnel shall not be exposed to a maximum positive normal reflected overpressure greater than 5.0 psi., when the operational shield is subjected to an MCI.

2. DESCRIPTION OF TEST.

An MCI is created with the operational shield. Blast pressure gages are used to measure blast overpressure.

3. CRITERIA FOR PASSING TEST

a. The operational shield shall be considered acceptable if it can be determined from a pressure-distance plot of the data, that personnel will not be exposed to a peak positive incident overpressure above 2.3 psi or a peak positive normal reflected overpressure above 5.0 psi.

4. INSTRUMENTATION

a. Blast pressure gages and electronic recording system. Based on the equivalent test charge weight of explosives and anticipated peak overpressure, the instrumentation system shall have the necessary response time and bandwidth to acquire data. Instrumentation shall be calibrated in accordance

with current procedures of TB 43-180, Calibration Requirements for the Maintenance of Army Materiel.

5. TEST PROCEDURE

a. When the shield is tested in a simulated operational bay environment, overpressure readings shall be taken at the following locations:

(1) At the center of probable head locations of each operator. For standing locations the gages shall be positioned 65 inches above the floor; for sitting locations it shall be 31.5 inches above the seat.

(2) At representative positions where transient personnel may be located.

b. When testing is conducted in open air, position blast gages around the shield in two or three concentric circles at distances where it is expected that overpressures of two or three concentric circles at distances where it is expected that overpressures of interest will be found. Stagger the gages so shock waves reaching the outer circles are not distorted by gages in the inner circle. The gages shall be placed at a height of 65 inches.

c. All instrumentation shall be within calibration at time of test.

d. If the shield is designed for use with more than one model or type of ammunition, select the item that would produce the maximum overpressure.

e. Apply an overload equal to 25 percent or more of the filler weight of the ammunition selected for the test, unless otherwise directed in an approved test plan.

f. All major explosive components should be fused separately to ensure simultaneous detonation or deflagration in order to simulate the MCI, unless otherwise directed in an approved test plan.

g. Function explosives and record overpressure readings.

h. Prepare pressure-distance plots from overpressure records.

CLASS-200 FRAGMENT RETENTION TESTS

METHOD 201

FRAGMENT RETENTION TEST

1. PURPOSE

a. Fragment testing is conducted to verify that a prototype operational shield will:

(1) Contain all fragmentation or direct fragmentation away from areas requiring protection.

(2) Prevent generation of secondary fragmentation within areas requiring protection.

(3) Prevent movement, overturning, or structural deflections which could result in personal injury.

2. DESCRIPTION OF TEST

An MCI is created to test the operational shield.

3. CRITERIA FOR PASSING TEST

a. Contain all fragmentation or direct fragmentation away from areas requiring protection.

b. Prevent generation of secondary fragmentation within areas requiring protection.

c. Prevent movement, overturning, or structural deflections which could result in personal injury.

4. TEST EQUIPMENT

Still picture camera equipment.

5. TEST PROCEDURE

a. Fragmentation retention test.

(1) If the shield is designed for use with more than one mode, or type of ammunition, select that item which will have the greatest potential

fragmentation or shape charge effect. Equipment, or reasonable simulation thereof, which shall perform the intended function on the ammunition, shall be positioned to generate secondary fragments.

(2) Apply an overload equal to 25 percent or more of the filler weight of the ammunition selected for the test, unless otherwise directed in an approved test plan.

(3) All major explosive components should be fused separately to ensure simultaneous detonation or deflagration in order to simulate the MCI, unless otherwise directed in the approved test plan.

(4) Function explosives.

b. Post-Test Procedure.

(1) Examine the interior and exterior for evidence of fragments. Photograph the shield to document test results.

(2) Examine shield for movement, overturning, or structural deflections which could result in personal injury.

(3) Shields designed for intentional detonation shall be examined for damage and an estimate made as to the ability of the shield to remain operational as specified in the design criteria.

CLASS-300 THERMAL EFFECTS MEASUREMENT

METHOD 301

HEAT FLUX MEASUREMENT

1. PURPOSE

a. Heat flux measurement is a condition of measure that personnel are not exposed to a maximum radiant heat flux determined in the equation given in criteria for passing test of this standard.

2. DESCRIPTION OF TEST

An MCI is created. Heat flux transducers are used to measure radiant heat flux.

3. CRITERIA FOR PASSING TEST

a. The operational shield shall be considered acceptable if it can be determined, from heat flux-distance and heat flux-time plots of test data, that personnel will not be exposed to a radiant heat flux rating exceeding the limits of the following formula: $F=1.0/(0.62t) T=0.7423 \text{ cal/cm}^2\text{-sec}$, where F= is the thermal flux, T=time in seconds.

4. INSTRUMENTATION

a. Heat flux transducers and electronic recording system. Based on the thermal flux expected at the location of the transducers, the instrumentation system shall have the necessary response time and bandwidth to acquire data. Instrumentation shall be calibrated in accordance with current procedures of TB 43-180. Calibration Requirements for the Maintenance of Army Materiel.

5. TEST PROCEDURE

a. When the shield is tested in a simulated operational bay environment, heat flux readings shall be taken at the following locations:

(1) At the center of probable head locations of each operator. For standing locations the transducers shall be positioned 65 inches above the

floor; for sitting locations it shall be 31.5 inches above the seat.

(2) At representative positions where transient personnel may be located.

b. In a free field test, flux values at various distances from the point of detonation can be estimated by the relationship: $O_1 \cdot (d_1^2) = O_2 \cdot (d_2^2)$, where O =heat flux in $\text{btu/in}^2\text{-sec}$ d =distance from point of detonation.

c. All instrumentation shall be within calibration at time of test.

d. If the shield is designed for use with more than one model or type of ammunition, select the item for the greatest heat flux.

e. Apply an overload equal to 25 percent or more of the filler weight of the ammunition selected for the test, unless otherwise directed in an approved test plan.

f. All major explosive components should be fused separately to ensure simultaneous detonation or deflagration in order to simulate the MCI, unless otherwise directed in an approved test plan.

g. Function explosives and record radiant flux readings.

h. Prepare heat flux-distance and heat flux-time plots from radiant flux recordings.

PART 4

TEST RESULTS

1. CLASS 100 - BLAST ATTENUATION TESTS

Peak blast overpressures were too low to be recorded by the calibrated gages.

2. CLASS 200 - FRAGMENTATION CONFINEMENT TESTS

No primary or secondary fragmentation was produced from functioning two M76 grenades in the test fixture.

3. CLASS 300 - THERMAL EFFECTS ATTENUATION TESTS

Thermal flux amplitudes were low level. As a result, no thermal flux was recorded.

4. TEST OBSERVATION(S):

a. Eight M76 IR Screening grenades were continuity tested. All items were acceptable.

b. Two M76 Grenades were functioned with a 25 percent black powder overcharge based on the launch propellant weight.

(1) The first grenade was functioned remotely. The black powder overcharge did not function since it was not placed in direct path of the hot gasses from the launch propellant. No shrapnel was observed, nor was there any recordable overpressure, or thermal flux.

(2) The second grenade was functioned with the overcharge. Again, no recordable overpressure, thermal flux or shrapnel was observed. Some residue from the launch propellant was observed on top of the APE 1974E002.

PART 5
TEST PLANS

Test Plan
For
Ammunition Peculiar Equipment 1974E002
Continuity Kit For M76 Grenade

1. PURPOSE: The purpose of this test is:

a. To ensure the Ammunition Peculiar Equipment (APE) 1974E002, Continuity Kit for Grenade, Launcher, Smoke, IR Screening, M76 accomplishes the required continuity testing of the M76 grenade.

b. To determine whether or not the APE 1974E002 provides Category I Operator Protection against the effects caused by the functioning of the expelling charge and delay charge, as prescribed by MIL-STD-398, Shields, Operational For Ammunition Operations, Criteria For Design Of and Tests For Acceptance.

2. BACKGROUND:

a. Munition:

(1) The M76 grenade is used with the M250 and similar grenade launchers and has a hazard classification of (02)1.2 with a net explosive weight of .0740 pounds. Each grenade is 2.59 inches in diameter, 9.3 inches long, and weights approximately 4 pounds.

(2) The M76 grenade is propelled from the launching device (discharger) when electric current at the firing contact activates the electrical match. The electrical match ignites the propellant which launches the grenade and ignites the pyrotechnic time delay. Launch acceleration causes the setback lock to displace aft, out-of-engagement with the safe and arm slider. When the slider/bore rider clears the launch tube, it moves into the armed position which aligns the explosive lead with the delay detonator and the booster lead. When the grenade reaches the desired range, the delay detonator ignites the explosive train which detonates the central burster. The IR composition (metallic dust) is scattered which creates the obscuring cloud.

b. APE 1974:

(1) The APE 1974, Assembly A001, Continuity Test Fixture, was originally designed, fabricated, tested and certified as an operational shield, according to the criteria of MIL-STD-398, for the L8 Series Grenades, Launcher, Smoke, Screening, RP.

(2) The Continuity Test Fixture, A001, was modified to accept both the L8 series grenades and the M76 grenades.

(3) The Continuity Test Fixture, A001, was tested on two separate occasions to determine if the unit provided the required level of operator protection for the M76 grenade that had been established for the L8 series grenades.

(a) During the first testing period, due to the grenade being contained in the grenade holder during propulsion into the lower chamber of Continuity Test Fixture, A001, the burster charge did not function. The reason the grenade failed to function was due to the increased weight of propelling the grenade-holder tube reducing the setback force below the threshold required to overcome the setback spring and the bore slider not being able to extend out of position, allowing alignment of the explosive lead.

(b) Therefore, during the second testing period, an equivalent amount of Composition 4 was substituted for the grenade and placed in the lower chamber. When the explosive was activated, the chamber cracked thereby failing to meet MIL-STD-398 acceptance criteria.

(4) Due to the requirement for a kit for the M76 grenade and mission requirements, the components of the APE 1974 have been reorganized and their nomenclature changed as follows:

FORMER

APE 1974, Test Equipment
for L8 Series Grenades,
Continuity Fixture (A001)

Assembly A008, Function
Test Assembly

NONE

NONE

NEW

APE 1974 1974, Continuity Test
Equipment For L8 Series Grenades

APE 1974E001, Function Test Kit
For L8 Series Grenades

APE 1974E002, Continuity Test For
Kit For M76, Grenade Launcher, Smoke,
IR Screening

APE 1974E003, Function Test Extension
Kit For M76, Grenade Launcher, Smoke,
IR Screening

3. DESIGN CONFIGURATION:

a. Based on the experience of the first test period, a concept was proposed and approved by HQ, U.S. Army Armament, Munitions and Chemical Command (AMCCOM) Safety and U.S. Army Materiel Command (AMC) Field Safety Activity (FSA), for a kit for the APE 1974 for continuity testing of the M76 grenade. The basis of the kit would be to prohibit the burster charge from functioning. This concept would be incorporated by:

(1) Eliminating launch acceleration thereby prohibiting the setback lock from moving out-of-engagement;

(2) Enclosing the grenade within a cylinder thereby prohibiting the slider/bore rider from moving and allowing alignment of the explosive lead with the delay detonator.

b. The Kit E002 will be similar in design to the Test Chamber Top, part 22, of the APE 1974, but longer to accommodate the M76 grenade and a closed end to prohibit motion of the grenade.

c. Interchangeability: Due to the length of the L8 and M76 grenades being different and the M76 grenade possessing a round collar around on one end, it is possible to ensure that neither grenade can be used in the wrong piece of equipment.

(1) The difference in diameter caused by the collar will restrict it from fitting into the basic APE 1974.

(2) The shorter length of the L8 grenade will prohibit them from engaging the test contacts of the kit for the M76 grenade.

4. ACCEPTANCE CRITERIA: The APE 1974E002 shall be considered acceptable if, upon completion of testing, the APE 1974E002 has accomplished the following:

a. The APE 1974E002, when used in conjunction with the APE 1980, Universal Resistance Instrument or similar resistance meter, has demonstrated that the kit can be used to determine whether continuity exists in the M76 grenade and that the amount of resistance in the grenade circuit can be measured.

b. The APE 1974E002 demonstrates that the burster charge does not function when an ignition current is applied to the grenade, the propelling charge, and delay element function.

c. The APE 1974E002 has demonstrated when used in conjunction with the basic APE, satisfies all the safety requirements of MIL-STD-398, Shields, Operational For Ammunition Operations, Criteria For Design Of And Tests For Acceptance when tested in accordance with Test Methods 101, Blast Overpressure Measurement, and 201, Fragment Retention Test, of MIL-STD-398 and the following qualifications to the test.

(1) Since only the expelling charge and delay charge are being functioned, the grenade being enclosed and the massive weight of the basic APE and kit providing a heat sink, no thermal hazard exists requiring Test Method 301, Heat Flux Measurement.

- (2) The 25 percent overcharge will not be used.

(a) Since the expelling charge and delay charge do not detonate but deflagrate, the addition of 25 percent more propellant or delay charge does not increase the maximum credible incident.

(b) Since the 25 percent addition would be propellant and delay charge, there is no possible way to activate these additions concurrently with its associate item nor is it practical or plausible to reload the grenade with the 25 percent additional charge.

5. TEST PROCEDURES: The test will be conducted according to the procedures outlined below and according to a locally developed SOP.

a. The test site will be building 628 (enclosures 1 and 2).

b. The APE 1974 with Kit E002 will be position on a grounded mat in Bay G, inspected for damage and grounded. The quality of the ground will be tested.

c. The APE 1980, Universal Resistance Test Instrument or similar instrument will be positioned in Bay F.

d. The cabling from APE 1974 will be taken into Bay F, but will not be attached to the test instrument.

e. The four side-on pressure transducers (KSP IND INC Model PT-302) will be located around the test fixture. All transducers will be located 65 inches above the floor and 12 inches away from the test fixture.

f. The cameras and lighting will be located to view the APE 1974 and Kit E002.

g. Two boxes (8 grenades) will be received from permanent storage, inspected and temporarily stored in Bay I.

h. Continuity Verification Testing:

(1) All personnel will retire to building 626 except for the project engineer, test officer and one ammunition handler. Close circuit television will be available in building 626 to view the operations being performed in Bay G.

(2) The ammunition handler will inspect and remove one grenade from Bay I to Bay G.

(3) The grenade will be placed in and secured in the APE 1974.

(4) The ammunition handler, project engineer and test officer will retire to Bay F.

(5) The wires from the APE 1974 will connect to the test instrument.

(6) The test instrument will be activated and the resistance reading will be recorded.

(7) In the event no continuity is indicated, the following steps should be completed.

(a) Disconnect the wires to the test instrument from the APE 1974.

(b) Return to Bay G.

(c) The ammunition handler will open the test fixture, inspect grenade, rotate the grenade 90 degrees, and proceed with step h(4).

(d) If no continuity is indicated a second time, remove and store the grenade and proceed with h(2).

(8) Repeat steps h(2) through h(7) as required for a total of eight grenades.

j. If the capability for determining continuity was satisfactory, then proceed with the Operation Shield Testing requirements; otherwise, stop the test at this point, return the grenades to permanent storage and secure the test facility.

k. Operation Shield Testing:

(1) All personnel will retire to building 626 except for the project engineer, test officer and one ammunition handler. Close circuit television will be available in building 626 to view the operations being performed in Bay G.

(2) The ammunition handler will inspect and remove one grenade from Bay I to Bay G.

(3) The grenade will be placed in and secured in the APE 1974.

(4) The ammunition handler, project engineer and test officer will retire to Bay F.

(5) The wires from the APE 1974 will be connected to the ignition wires leading to building 626.

(6) The ammunition handler, project engineer and test officer will retire to building 626.

(7) The ignition wires will be connected to a 12 volt ignition source (APE 1963, Electronic Control Unit).

(8) All test instrumentation will be activated.

(9) The ignition source will be activated causing the expelling and delay charges of the grenade to function.

(10) Disconnect the ignition wires from the ignition source.

(11) After one hour has elapsed, the test officer, project engineer, and ammunition handler may return to building 626 and remove the unexploded grenade from the APE 1974, place the grenade in a container, and temporarily store behind and under sand bags in bay to the west of Bay A until completion of the test or end of day, whichever comes earlier.

(12) After the grenade is removed and stored, other personnel may enter building 628 and inspect the APE 1974 and Kit E002 for signs of failure such as cracks or breakage of the Continuity Test Fixture's components, welds, etc.

(13) If the first test is successful, meaning no damage to the test fixture, repeat steps 1 through 11 for a second test.

(14) Return unused grenades to permanent storage and used to separate storage or deactivate furnace.

(15) Clean and secure test area.

PART 6

SOP

1. U.S. Army Defense Ammunition Center and School

STANDING OPERATING PROCEDURE FOR:

2. ITEM: a. Grenade, Launcher, Smoke; IR Screening, M76 3. OPERATION Engineering Test of APE 1974E002
- b. 1330-G826 4. ESTIMATED DAILY PRODUCTION RATE N/A
- c. Packaged (02) 1.2, Fire Symbol 2 5. ORGANIZATION SYMBOL SMCAC-DEV
- d. Unpackaged 1.1, Fire Symbol 1 6. SOP No. AC-G826-M-011 DATE _____
- e. Chemical Hazard Symbol 2 7. AUTHORITY AR 700-20 DATE 15 Apr 79
- a. Rev No. _____ DATE _____
- b. Change No. _____ DATE _____

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SAFETY OFFICE	<u>Bridgette D. Cottral</u> 21 Jul 89 BRIDGETTE D. COTTRAL	Safety Officer

13. APPROVAL:

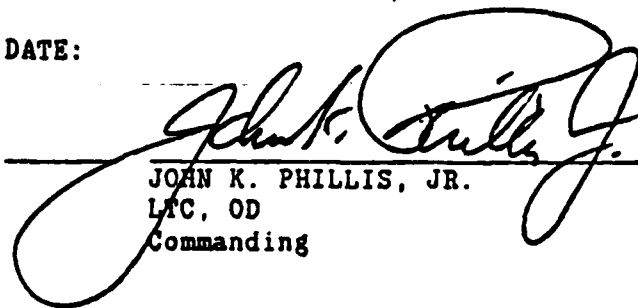


JOHN L. BYRD, JR.

Director

Defense Ammunition Center & School

DATE:



JOHN K. PHILLIS, JR.

LTC, OD

Commanding

DATE:

24 Jul 89

TEST ENGINEER'S STATEMENT

SOP No. AC-G826-M-011 REV No. CHANGE No. DATE

1. The test engineer will sign this statement:
 - a. When first assigned as test engineer of the operation.
 - b. When an approved formal or interim change is made to the SOP.
 - c. At least once per quarter during continuing operations.
 - d. After absence from the job in excess of 15 consecutive workdays.
2. I have personally reviewed each of the operational steps of the SOP and have no question in my mind that the operation can be performed safely, efficiently, and in an environmentally acceptable manner. I have trained the operators in the details of their part of the operation and have instructed them to follow the SOP without deviation:

TEST ENGINEER'S NAME

DATE

_____	_____
_____	_____
_____	_____
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OPERATOR'S STATEMENT

SOP No. AC-G826-M-011 REV No. CHANGE No. DATE

1. The operator will sign this statement:
 - a. When first assigned to the operation.
 - b. When an approved formal or interim change is made to the SOP.
 - c. At least once per quarter during continuing operations.
 - d. After absence from the job in excess of 15 consecutive workdays.
2. I have read or have had read to me and understand the general and specific safety and environmental requirements, personnel and explosive limits, work description and inspection requirements necessary to accomplish my operation. I have been thoroughly trained in, and am familiar with, my part of the operation, and I agree to abide by these instructions throughout my assignment to the operation.

[illegible]

SOP NO. AC-G826-M-011 DATE _____

REV NO. _____ DATE _____

CHANGE NO. _____ DATE _____

INDEX OF OPERATIONS

<u>OPER NO.</u>	<u>BLDG NO. OR SITE</u>	<u>BAY NO.</u>	<u>TOTAL EXPL ALLOWED IN BAY (REF COL. 3)</u>	<u>DESCRIPTION OF OPERATION</u>	<u>PAGE NO.</u>
1	600 Area	N/A	Inert	Preparation of Test Site	8
2	628	I	0.594 lbs.	Receipt of Test Ammunition	14
3	628	G	0.074 lbs.	Continuity Verification Test	17
4	626/628	G	0.075 lbs.	Operational Shield Test	22

REMARKS:

Operation consists of receiving eight grenades (IR Screening, M76) and two bags of black powder (.43 grams) from storage. Continuity Verification Testing will consist of continuity testing of all eight grenades. Operational Shield Testing will consist of two firings of a grenade and a 25 percent overload of the expelling charge and delay charge.

REFERENCES: AMC-R 385-100
AMC-R 700-107
TM 43-0001-29
Test Plan for APE 1974E002
SV-0000-L-006

This SOP supersedes AC-G826-M-108, 19 Jan 88.

GENERAL SAFETY REQUIREMENTS

1. Standing Operating Procedure (SOP), applicable portion, shall be conspicuously posted in rooms or bays involved in the operation. Supervisory personnel shall maintain copies of a complete SOP and be responsible for the enforcement of its provisions.
2. There will be no deviation or change from the approved SOP without prior approval of the Center Director and the Installation Commander, or their designated representatives.
3. Employees will not tamper with any safety devices or protective equipment.
4. Any defect or unusual condition noted that is not covered by this SOP will be reported immediately to the test engineer or project engineer.
5. Appropriate fire symbol and chemical hazard symbol shall be displayed in such a manner as to be easily visible from all roads of approach.
6. The test engineer is responsible to report to the safety office, all injuries and accidents occurring during the test. In the event of a fire or explosion, activate all installed fire extinguishing equipment and alarm systems. The person discovering the fire/explosion will notify the Fire Department (911), Safety Officer (8838), Chief of Quality Assurance (8624), and Chief of Operations (8650).
7. All fires starting in the vicinity of ammunition or explosives shall be reported immediately to the Fire Department (911) and fought immediately with all available means and without awaiting specific instructions. However, if the fire involves explosive materials or is supplying heat to it, or if the fire is so large that it can't be extinguished with the equipment at hand, the personnel involved shall evacuate and seek safety.
8. Care will be taken to limit exposure of a minimum number of personnel, for a minimum time, to a minimum amount of hazardous material consistent with safe and efficient operations.
9. Personnel and installed equipment will be so located that operators will have an unobstructed path of travel to the nearest available exits.
10. Work locations will be maintained and left in a neat and orderly condition. Good housekeeping must be maintained!
11. All handtools, ferrous and/or nonferrous, shall be maintained in a good state of repair.
12. Operators lifting material will use proper, safe hand holds, assume proper lifting position, avoid twisting when lifting or carrying, and avoid sharp objects.
13. Each Material Handling Equipment (MHE) and/or vehicle operator will have in his possession a valid operators permit for the particular piece of equipment to be operated.

14. All MHE shall have a current load test/inspection IAW TB 43-0142.
15. Steel toed safety shoes will be worn by all personnel engaged in material handling operations.
16. Explosives, loaded ammunition, packaged ammunition, or bulk explosives shall not be handled roughly, thrown about, tumbled, dropped, or walked over other explosives or ammunition. Massive ammunition items, packaged in Department of Transportation (DOT) approved containers designed to permit dragging, rolling or towing, may be so moved when necessary during handling for storage and transportation.
17. Any ammunition determined to be dangerous to handle or store will be reported immediately to the test engineer. Operations will be suspended, and, if warranted, evacuated pending further instructions.
18. All installed metallic equipment shall be grounded and grounding system shall be tested for electrical resistance and continuity prior to start of operation in accordance with paragraph 7-4, AMC-R 385-100 and SV-0000-T-328.
19. The test engineer will be responsible for directing the actions to be taken during the event of an electrical storm. His decision will be based on the operation being performed and the severity of the electrical storm. If Building 628 is deemed to be hazardous, personnel will evacuate to Building 626. If the 600 area is deemed to be hazardous, personnel will evacuate to their normal work stations.
20. Work tables will be equipped with side boards to prevent ammunition from rolling off.
21. When procedures require personnel to wear conductive sole safety shoes, they must be tested prior to start of operation and once each day thereafter. Test engineer shall ensure results of test are recorded showing date and time of test, plus name of individual wearing shoes being tested.
22. Matches, lighters, or other spark producing devices are forbidden at test site, and in the ammunition area.
23. All employees working in an area which has been determined a noise hazard area will wear approved hearing protection IAW AR 40-5. Noise hazardous areas will be defined by the Safety Office and posted IAW TB MED 501. Personnel working in a noise hazard area will be included in the installation hearing conservation program.
24. Before starting operation, all personnel involved in operation/test should be walked through complete operation using the approved SOP as a guide.
25. Surveillance personnel shall be present during actual operation.
26. Prior to starting operation, notify Mission Division (Ext. 8631), Security Branch (Ext. 8832), Chief of Surveillance (Ext. 8624), Safety Office (Ext. 8838), and the Fire Department (Ext. 8431) that a test/operation is to be conducted. Give location and type of test/operation.

OPERATIONS FORMAT (Normal Operation)

A. **STANDING OPERATING PROCEDURE FOR:**
Engineering Test of APE 1974E002

B. **OPERATION NO.:**

1

C. **BAY NO.:**

600 Area

D. **SOP NO.:**

AC-G826-M-011

DATE:

E. **REV NO.:**

DATE:

F. **CHANGE NO.:**

DATE:

G. **OPERATION:**

Preparation of Test Site (600 Area)

H. **EXPLOSIVE LIMITS:**

UNITS: Inert

EXPLOSIVE LBS: Inert

I. **PERSONNEL LIMITS:**

OPERATORS: 4

TRANSIENTS: 4

J. **STEP NO.**

DESCRIPTION

SPECIFIC INSTRUCTION

(Safety, Operational, Quality Characteristics.)

1. Locate instrumentation van.

1. (O) If used, position instrumentation van outside Building 628 (as shown in figure 1).

2. Locate trauma-aid kit.

2. (S) (O) Position a trauma-aid kit in Building 626.

3. Locate fire extinguishers.

3. (S) (O) Position one each fire extinguisher as follows:

a. Building 626.

b. Outside Bay I.

c. Outside Bay G.

4. Locate grounding mat/plate.

4. a. (O) Position grounding mat/plate in Bay G and Bay I of Building 628.

b. (O) Electrically bond mat/plate to Building 628 grounding system.

5. Locate APE 1974E002.

5. a. (O) Position APE 1974E002 on the grounding mat/plate in Bay G of Building 628 (as shown in figure 1).

OPERATIONS FORMAT CONTINUATION SHEET
(Normal Operation)

STEP NO.	DESCRIPTION	SPECIFIC INSTRUCTION (Safety, Operational, Quality Characteristics.)
5. Locate APE 1974E002 (continued).		<p>5. b. (S) (O) Inspect APE 1974E002 for physical damage which might preclude its use.</p> <p>c. (O) Electrically bond APE 1974E002, to Building 628 grounding system.</p>
6. Locate test instrumentation.		<p>6. a. (O) Position APE 1980 Universal Resistance Test Instrument or similar instrument in Bay F of Building 628.</p> <p>b. (O) Position the four side-on pressure transducers (KSP IND INC Model PT-302) around the APE 1974E002 in Bay G of Building 628 (adjustment will be made later).</p> <p>c. (O) Position high-speed movie camera to give a clear view of APE 1974E002.</p> <p>d. (S) (O) Movie camera should be barricaded to protect camera.</p> <p>e. (S) (O) If used, auxiliary lighting positioned outside Bay G will be of an explosion-proof type.</p>
7. Locate cabling.		<p>7. a. (O) Route cabling from APE 1974E002 and the pressure transducers into Bay F. Do not attach cabling to the test instruments.</p> <p>b. (S) (O) Electrically bond APE 1980 to grounding system.</p>

OPERATIONS FORMAT CONTINUATION SHEET
(Normal Operation)

STEP NO.	DESCRIPTION	SPECIFIC INSTRUCTION (Safety, Operational, Quality Characteristics.)
7.	Locate cabling (continued).	7. c. (O) Route two firing wires from Bay G to Building 626. d. (S) (O) Shunt firing wires until ready for testing.
8.	Locate firing device.	8. a. (O) Position APE 1963 electronic unit in Building 626. b. (S) (O) Ground APE 1963.
9.	Locate APE 1953.	9. (O) Position APE 1953 at the electrical outlet between Bays D and E.
10.	Inspect and test of grounds.	10. (S) (O) Surveillance personnel using procedures in paragraphs 7-2 and 7-4 of AMC-R 385-100 and SOP No. SV-0000-T-328, will inspect and test all grounds.
11.	Locate barricaded remote control closed-circuit television system.	11. a. (O) Position camera outside Bay G, Building 628. b. (O) Position monitor in Building 626.
12.	Locate barricades and signs.	12. a. (S) (O) Position barricades and controlled test signs at west and east entrance gates of the test-site area. b. (S) (O) Inspect to ensure that all other test-site area gates are locked. c. (S) (O) Position controlled test signs on railroad gates and back gate.

OPERATIONS FORMAT CONTINUATION SHEET
(Normal Operation)

STEP NO.	DESCRIPTION	SPECIFIC INSTRUCTION (Safety, Operational, Quality Characteristics.)
12.	Locate barricades and signs (continued).	d. (S) (O) Position one (1) each, radio transmission prohibited signs 200 feet from Building 628 at the following locations: (1) Along north service road. (2) Along center service road. (3) Along south service road.
13.	Test telephone.	13. (O) Test telephone by dialing extension 8929 (SMCAC- DEV). Request person answering to dial ext 8987 to check that the telephone rings.

K. SPECIAL REQUIREMENTS.

1. Surveillance Activity will inspect operation for safety and compliance with this SOP.

2. Operators will wear safety shoes when preparing test-site.

L. EQUIPMENT, TOOLS, GAUGES, AND SUPPLIES.

<u>ITEM</u>	<u>QTY REQD</u>	<u>SPEC NO. OR DWG NO.</u>	<u>MCSN OR NSN NO.</u>
1. Road Barricade	2		Locally Procured
2. Red Warning Flag	1		Locally Fabricated
3. Fire Extinguisher (10 lb., ABC rated)	3		Locally Procured
4. Trauma-Aid Kit	1		Locally Procured
5. Closed-Circuit Television System	1		
6. APE 1974E002 Continuity Test Fixture	1		APE 1974E002
7. Firing Wire	200 ft.	16 AWG	
8. High-Speed Movie Camera	1	Model 42-0002	

L. EQUIPMENT, TOOLS, GAUGES, AND SUPPLIES (continued).

<u>ITEM</u>	<u>QTY REQD</u>	<u>SPEC NO. OR DWG NO.</u>	<u>MCSN OR NSN NO.</u>
9. Test Instrumentation	As required		Locally Procured
10. Safety Shoes	1 pair per individual	MIL-S-418	
11. Auxiliary Lighting	As required		Locally Procured
12. Warning Signs	4		Locally Fabricated
13. APE 1963 Electronic Control Unit	1		APE 1963
14. Instrumentation Van	1		Locally Fabricated
15. Signs Prohibiting Radio Transmission	3		Locally Fabricated
16. Grounding Mat/Plate	2		Locally Procured
17. APE 1953.	1		APE 1953.

OPERATIONS FORMAT (Normal Operation)

A. **STANDING OPERATING PROCEDURE FOR:**
Engineering Test of APE 1974E002

B. **OPERATION NO.:**

2

C. **BAY NO.:**

Building 628

D. **SOP NO.:**

DATE:

AC-G826-M-011

E. **REV NO.:**

DATE:

F. **CHANGE NO.:**

DATE:

G. **OPERATION:**

Receipt of Test Ammunition

H. **EXPLOSIVE LIMITS:**

UNITS: 8 Grenades, 2 bags black powder

EXPLOSIVE LBS: 0.592, .86 grams

I. **PERSONNEL LIMITS:**

OPERATORS: 4

TRANSIENTS: 4

J. **STEP NO.**

DESCRIPTION

SPECIFIC INSTRUCTION

(Safety, Operational, Quality Characteristics.)

1. Receive test ammunition.

1. a. (O) Ammunition will be transported IAW SOP SV-0000-L-006 on depot movement.

b. (O) Unlock Bay I and ensure that storage space is clean.

c. (S) (O) Position Fire Symbol No. 1 and Chemical Hazard Symbol No. 2 on Building 628.

2. Unload motor vehicle.

2. (O) Remove test ammunition from carrier by hand and place in temporary storage in Bay 1.

3. Inventory test ammunition.

3. a. (O) Inventory test ammunition to ensure that correct quantity is delivered. Quantity and lot number will be verified against DA Form 4508.

b. (O) Release carrier after completion of operation.

K. SPECIAL REQUIREMENTS.

1. Surveillance activity will inspect operation for safety and compliance with this SOP.

2. Handle ammunition carefully at all times.

3. When building is not occupied, temporary storage bay must be locked with an approved locking device if explosives are present. Ammunition or explosives will not remain in storage bay overnight unless bay meets all requirements of DOD 5100.76M (Physical Security of Weapons, Ammunition and Explosives). If bay meets the requirements of DOD 5100.76M and ammunition is to remain in bay overnight, USADACS test engineer will notify the Chief of Security Branch as to the type of ammunition stored there, building number, and requirement for checks of locks IAW DOD 5100.76M.

L. EQUIPMENT, TOOLS, GAUGES AND SUPPLIES.

<u>ITEM</u>	<u>QTY REQD</u>	<u>SPEC NO. OR DWG NO.</u>	<u>MCSN OR NSN NO.</u>
1. Safety Shoes	1 pair per individual	MIL-S-418	
2. High Security Padlock	1		5340-00-799-8248
3. Fire Symbol	As required	No. 1	Locally Fabricated
4. Chemical Hazard Symbol #2	As required	No. 2	Locally Fabricated

OPERATIONS FORMAT

(Normal Operation)

A. **STANDING OPERATING PROCEDURE FOR:**
Engineering Test of APE 1974E002

B. **OPERATION NO.:**

3

C. **BAY NO.:**

Bays G and I

D. **SOP NO.:**

DATE:

AC-6826-M-011

E. **REV NO.:**

DATE:

F. **CHANGE NO.:**

DATE:

G. **OPERATION:**

Continuity Verification Test

H. **EXPLOSIVE LIMITS:**

UNITS: 1 Grenade/Bay G; 8 Grenades, 2 bags black powder/Bay I EXPLOSIVE LBS: .074/Bay G; 0.594/Bay I

I. **PERSONNEL LIMITS:**

OPERATORS: 3

TRANSIENTS: 4

J. **STEP
NO.**

DESCRIPTION

SPECIFIC INSTRUCTION

(Safety, Operational, Quality Characteristics.)

1. Raise warning flag.

1. (S) (O) Raise warning flag on flagpole located on north side of Building 628.

2. Make pretest notifications.

2. (S) (O) Notify the following that a test is being conducted at Building 628:

(1) Safety Officer
(ext 8838 or 8700)

(2) Chief of Surveillance
(ext 8624)

(3) Fire Department
(ext 8431)

(4) Facilities Engineer
(ext 8521)

(5) Security Office
(ext 8881)

Also advise security that no unauthorized personnel should be within 200 feet south of Building 628.

OPERATIONS FORMAT CONTINUATION SHEET
(Normal Operation)

STEP NO.	DESCRIPTION	SPECIFIC INSTRUCTION (Safety, Operational, Quality Characteristics.)
3.	Test conductive shoes.	<p>3. a. (S) (O) Using APE 1953 test conductive shoes on all individuals performing this operation IAW AMC-R 385-100, para 10-13.</p> <p>b. (O) Documentation of this test will be kept by the test engineer.</p>
4.	Activate monitor equipment.	<p>4. (O) Turn on closed-circuit television and ensure that the operations being performed in Bay G will be available in Building 626.</p>
CAUTION: Operators performing steps 6 and 7 will stand on a grounded conductive mat.		
5.	Unpackage grenades.	<p>5. (O) Proceed to Bay I, open boxes and remove all grenades from the boxes.</p>
6	Inspect grenades.	<p>6. a. (S) (O) Inspect grenades for any conditions which would make them unsafe to handle in a normal manner. If any of the defects listed below are found during inspection, pack the grenade in a metal box and transfer to SVADA, Mission Division, for disposition:</p> <p>6. (1) Grenade body perforated.</p> <p>(2) Grenade body deformed to the extent that it will not enter continuity test fixture.</p>

OPERATIONS FORMAT CONTINUATION SHEET
(Normal Operation)

STEP NO.	DESCRIPTION	SPECIFIC INSTRUCTION (Safety, Operational, Quality Characteristics.)
7.	Clear Building 628 of excess personnel.	<p>7. a. (O) All personnel, except for the following, will retire to Building 626:</p> <p>(1) Explosives operator. (2) Project engineer. (3) Test engineer.</p>
		<p>b. (S) (O) Check area to assure that all excess personnel are in Building 626 and no unauthorized personnel are in or near test area.</p>
8.	Transfer grenade to Bay G.	<p>8. (O) Manually transport an acceptable grenade from Bay I to Bay G.</p>
9.	Position and secure grenade in APE 1974E002.	<p>9. a. (O) Open door on test fixture.</p> <p>b. (O) Place grenade in fixture with metal section up.</p> <p>c. (S) (O) Close fixture, making sure door is latched.</p>
10.	Operating personnel retire to Bay F.	<p>10. (S) (O) The explosive operator, project engineer, and test engineer will retire to Bay F.</p>
11.	Connect wires.	<p>11. (O) Connect the wire from the APE 1974 to the APE 1980.</p>
12.	Activate test instrument.	<p>12. (O) The APE 1980 will be activated and the resistance reading will be recorded.</p>
13.	Procedures if continuity is indicated.	<p>13. a. (S) (O) Disconnect the wires at the APE 1980.</p> <p>b. (O) Return to Bay G.</p>

OPERATIONS FORMAT CONTINUATION SHEET
(Normal Operation)

STEP NO.	DESCRIPTION	SPECIFIC INSTRUCTION (Safety, Operational, Quality Characteristics.)
13. Procedures if continuity is indicated (continued).		<p data-bbox="933 427 1389 555">13. c. (O) Open the test fixture, remove the grenade, and manually transport it to Bay I.</p> <p data-bbox="933 591 1438 687">d. (O) The tested grenade will be stored in its original packaging material.</p> <p data-bbox="933 723 1422 783">e. (O) Repeat steps 6-10 for a total of eight grenades.</p>
14. Procedures if no continuity is indicated.		<p data-bbox="933 825 1438 883">14. a. (S) (O) Disconnect the wires at the APE 1980.</p> <p data-bbox="1014 919 1400 946">b. (O) Return to Bay G.</p> <p data-bbox="933 983 1356 1042">c. (O) Open the test fixture.</p> <p data-bbox="933 1078 1438 1174">d. (O) Inspect grenade to determine if properly positioned.</p> <p data-bbox="933 1210 1438 1270">e. (O) Rotate grenade 90-180 degrees in any direction.</p> <p data-bbox="933 1306 1438 1366">f. (S) (O) Close fixture, making sure door is latched.</p> <p data-bbox="933 1402 1389 1461">g. (O) Proceed to step 10.</p>
15. Procedures if no continuity is indicated a second time.		<p data-bbox="933 1504 1372 1561">15. a. (O) Disconnect the wires to the APE 1980.</p> <p data-bbox="1014 1598 1400 1625">b. (O) Return to Bay G.</p> <p data-bbox="933 1661 1455 1757">c. (O) Open the test fixture, remove the grenade, and manually transport it to Bay I.</p> <p data-bbox="933 1793 1450 1891">d. (O) Identify grenade so that it will not be used during operation shield testing.</p>

OPERATIONS FORMAT CONTINUATION SHEET
(Normal Operation)

STEP NO.	DESCRIPTION	SPECIFIC INSTRUCTION (Safety, Operational, Quality Characteristics.)
15.	Procedures if no continuity is indicated a second time (continued).	15. e. Store grenade in its original packaging material.
		15. f. (O) Repeat steps 6-11 for a total of eight grenades.
16.	Operations decision determination.	16. (O) If the capability for determining continuity was satisfactory, then proceed with the Operational Shield Testing operation; otherwise, stop the test at this point, return the grenades to permanent storage, and secure the test facility.

K. SPECIAL REQUIREMENTS.

1. Surveillance Activity will inspect operation for safety and compliance with this SOP.

2. Safety Requirements:

a. Operators handling grenades shall wear flame-resistant coveralls, and conductive safety shoes.

b. Operator inspecting grenades and installing and removing grenades from APE 1974 will stand on a grounded conductive mat.

L. EQUIPMENT, TOOLS, GAUGES, AND SUPPLIES.

<u>ITEM</u>	<u>QTY REQD</u>	<u>SPEC NO. OR DWG NO.</u>	<u>MCSN OR NSN NO.</u>
1. Flame-resistant Coveralls	1 pair per individual	MIL-C-146	
2. Conductive Safety Shoes	1 pair per individual	MIL-S-379	
3. Conductive Mats	As required		Locally fabricated
4. APE 1953	1 each		APE 1953
5. Box, Metal, M2A1	1 each		8140-00-960-1699
6. APE 1974E002	1 each		APE 1974E002
7. APE 1980	1 each		APE 1980

OPERATIONS FORMAT

(Normal Operation)

A. **STANDING OPERATING PROCEDURE FOR:**
Engineering Test of APE 1974E002

B. **OPERATION NO.:**

4

C. **BAY NO.:**

Bays G and I

D. **SOP NO.:**

AC-G826-M-011

DATE:

E. **REV NO.:**

DATE:

F. **CHANGE NO.:**

DATE:

G. **OPERATION:**

Operational Shield Test

H. **EXPLOSIVE LIMITS:**

UNITS: 1 grenade, 1 bag black powder

EXPLOSIVE LBS: .074, .43 grams

I. **PERSONNEL LIMITS:**

OPERATORS: 3

TRANSIENTS: 4

J. **STEP**

DESCRIPTION

SPECIFIC INSTRUCTION

NO.

(Safety, Operational, Quality Characteristics.)

NOTE: If this is the first operation of the day, perform steps 1, 2, and 3 of Operation No. 3.

NOTE: If this is a continuation of this operation, ensure that a conductive shoe test is performed IAW Operation No. 3, step 3.

1. Test firing wires for continuity.

1. a. (O) Check galvanometer by holding a piece of metal across the terminals.

(1) (O) Wide deflection indicates a good meter.

(2) (O) If not, replace galvanometer.

b. Shunt firing wires at Building 626.

c. (O) Untwist the wires at Bay F and touch the ends to galvanometer posts.

(1) (O) No reading indicates a break in the wire. Repair and retest.

OPERATIONS FORMAT CONTINUATION SHEET

(Normal Operation)

STEP NO.	DESCRIPTION	SPECIFIC INSTRUCTION (Safety, Operational, Quality Characteristics.)
1.	Test firing wires for continuity (continued).	<p>1. (2) (O) A slight movement of the needle indicates high resistance, replace wires.</p> <p>. (3) (O) A wide deflection indicates good firing leads.</p> <p>d. (S) (O) Shunt firing wires at Bay G, Building 628.</p>
2.	Activate monitor equipment.	2. (O) Turn on closed circuit-television and ensure that the operations being performed in Bay G will be available in Building 626.
3.	Position transducers.	3. (O) All transducers will be located 65 inches above the ground and 12 inches away from the test fixture.
4.	Clear Building 628 of excess personnel.	<p>4. a. (O) All personnel, except for the following, will retire to Building 626:</p> <p>(1) Explosive operator.</p> <p>(2) Project engineer.</p> <p>(3) Test engineer.</p> <p>b. (S) (O) Check area to assure that all excess personnel are in Building 626 and no unauthorized personnel are in or near test area.</p>
5.	Transfer test munitions to Bay G.	5. (O) Manually transport an acceptable grenade and metal container containing black powder from Bay I to Bay G.

OPERATIONS FORMAT CONTINUATION SHEET
(Normal Operation)

STEP NO.	DESCRIPTION	SPECIFIC INSTRUCTION (Safety, Operational, Quality Characteristics.)
6. Position and secure test munitions in APE 1974E002.		<p>6. a. (O) Open door on test fixture.</p> <p>b. (O) Place grenade in fixture with metal section up.</p> <p>c. (O) Place one bag of black powder along outside edge of grenade.</p> <p>d. (S) (O) Close fixture, making sure door is latched.</p> <p>e. (S) (O) Return the metal container to Bay 1.</p>
7. Operating personnel retire to Bay F.		<p>7. (S) (O) The explosive operator, project engineer, and test engineer will retire to Bay F.</p>
8. Connect wires.		<p>8. a. (O) Check serviceability of No. 47 radio pilot lamp by connecting leads to a dry cell (lamp should glow).</p> <p>b. (O) At Bay F, untwist ends of firing wire.</p> <p>c. (O) Place leads of No. 47 radio pilot lamp across leads of firing wire (lamp should not glow). If lamp glows, further testing will not be accomplished.</p>
9. Inspect test setup.		<p>d. (O) Connect firing wires to leads on APE 1974E002.</p> <p>9. (O) Project engineer and test engineer will inspect test setup.</p>

OPERATIONS FORMAT CONTINUATION SHEET
(Normal Operation)

STEP NO.	DESCRIPTION	SPECIFIC INSTRUCTION (Safety, Operational, Quality Characteristics.)
10. Clear Building G of personnel.		<p>10. a. (O) All personnel will retire to Building 626.</p> <p>b. (S) (O) Explosive operator and USADACS representatives shall check area to assure that all personnel are in Building 626, and no unauthorized personnel are in or near test area.</p> <p>c. (S) (O) Sound the siren for 10 seconds.</p>
11. Test continuity of system and attach firing wires to electronic control unit.		<p>11. a. (S) (O) Ensure APE 1963 main power switch is in the "off" position.</p> <p>b. (O) At Building 626, untwist ends of firing wire and touch ends to galvanometer post. This should cause a wide deflection of the needle (which indicates continuity).</p> <p>c. (O) If system has continuity, connect firing wires to APE 1963.</p> <p>d. (S) (O) If there is no continuity, twist ends of test wires together, check out system, and retest continuity.</p>
12. Activate test instrumentation.		<p>12. (O) Turn on high-speed camera and transducer instrumentation.</p>
13. Initiate grenade.		<p>13. a. (S) (O) Explosive operator shall ensure that all test personnel are inside building and the test area is clear, before unlocking switch.</p>

OPERATIONS FORMAT CONTINUATION SHEET
(Normal Operation)

STEP NO.	DESCRIPTION	SPECIFIC INSTRUCTION (Safety, Operational, Quality Characteristics.)
13.	Initiate grenade (continued).	<p>13. b. (O) Insert key in switch and turn to 'on' position. Operate APE 1963 1AW instructions in APE operational manual to function grenade.</p> <p>c. (S) (O) One report should be heard. The ignition source will be activated causing the expelling and delay charges of the grenade to function.</p> <p>d. (S) (O) A second report heard approximately 1.7 seconds after the first will indicate that the burster charge has functioned and that the test has failed.</p> <p>e. (S) (O) Lock APE 1963 in 'off' position and remove key.</p> <p>f. (S) (O) Disconnect firing wires from APE 1963 and twist them together.</p> <p>g. (S) (O) All personnel will remain in Building 626 for 60 minutes.</p>
14.	Return to Building 626.	14. (O) After one hour has elapsed, the test engineer, project engineer, and explosive operator will return to Bay G.
15.	Remove grenade.	15. (O) Open door on APE 1974E002 and remove grenade.
16.	Package grenade.	16. (S) (O) Place grenade in a metal container, adding packing material to make a tight pack, and close lid.

OPERATIONS FORMAT CONTINUATION SHEET
(Normal Operation)

STEP NO.	DESCRIPTION	SPECIFIC INSTRUCTION (Safety, Operational, Quality Characteristics.)
17.	Store grenade.	17. (S) (O) Temporarily store grenade behind and under sand bags in bay to the west of Bay A, until completion of the test or end of day, whichever comes first.
18.	Inspect APE 1974E002.	18. a. (O) Other personnel may enter Building 628. b. (O) Inspect APE 1974E002 for signs of failure: (1) Cracks. (2) Breakage of components. (3) Welds. c. (O) If the first test is successful, meaning no damage to the test fixture, repeat steps 1-18 for a second test.
19.	Return unused grenades.	19. a. (O) Pack unused grenades with original packaging material. b. (O) Place grenades in original box and close lid. c. (O) Appropriately mark and identify short box. d. (O) Transfer grenades to SVADA, Mission Division, for storage.

OPERATIONS FORMAT CONTINUATION SHEET
(Normal Operation)

STEP NO.	DESCRIPTION	SPECIFIC INSTRUCTION (Safety, Operational, Quality Characteristics.)
20.	Return partially fired grenades.	20. a. (O) Identify contents of previously packed container as partially functioned. b. (O) Transfer grenades to SVADA, Mission Division, pending disposal disposition.
21.	Clean and secure test area.	21. a. (O) Perform operations as directed by test engineer. b. (O) Notify Security Office (ext 8881) when testing is complete.

K. SPECIAL REQUIREMENTS.

1. Surveillance Activity will inspect operation for safety and compliance with this SOP.

2. Safety requirements:

a. Operators handling grenades shall wear flame-resistant coveralls and conductive safety shoes.

b. Operator inspecting grenades and installing and removing grenades from APE 1974 will stand on a grounded conductive mat.

c. Before connecting the firing wires to the APE 1974E002 wires, the firing wires shall be tested to determine if hazards from stray currents are present. A dummy test circuit, essentially the same as the actual firing circuit except that a No. 47 radio pilot lamp of known good quality inserted in place of the grenade, shall be used without applying electric current to the circuit. If any glow of the radio pilot lamp is observed when viewed in darkness, testing will not continue until the induced current or stray radio frequency (RF) energy source is eliminated.

d. Key operated main power switch of the APE 1963 will be locked in the "off" position, and the test engineer will have the key in his possession to control firing of test weapons.

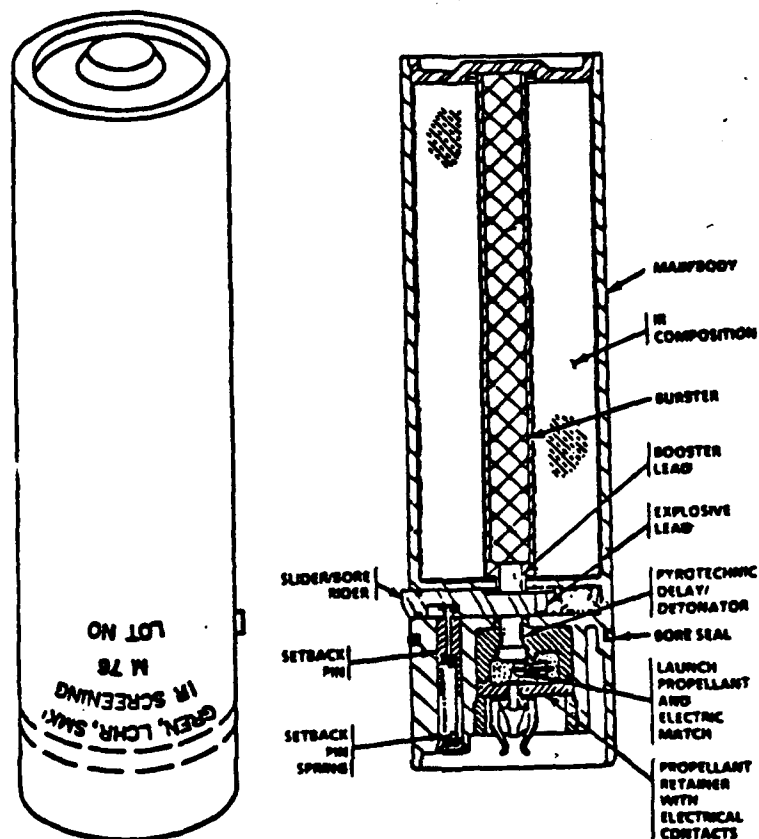
e. In the event of a malfunction, wait 60 minutes inside Building 626 before taking any action.

f. No attempt will be made to extinguish fires involving ammunition and/or explosives.

L. EQUIPMENT, TOOLS, GAUGES, AND SUPPLIES.

<u>ITEM</u>	<u>QTY REQD</u>	<u>SPEC NO. OR DWG NO.</u>	<u>MCSN OR NSN NO.</u>
1. Leather-Palmed Gloves	As required	MIL-G-236	
2. APE 1963	1		APE 1963
3. Flame-Resistant Coveralls	1 pair per individual	MIL-C-14610	
4. Conductive Safety Shoes	1 pair per individual	MIL-S-379	
5. Conductive Mats	As required		Locally fabricated
6. Galvanometer	1 each		6625-00-539-8444
7. No. 47 Radio	1 each		6240-00-155-8706
8. 1 1/2-volt Battery (C or D)	1 each		6135-00-935-5301 or 6135-00-930-0030
9. Box, Metal, M2A1	1 each		8140-00-960-1699
10. APE 1974E002	1		APE 1974E002
11. APE 1953	1		APE 1953

GRENADE, LAUNCHER, SMOKE: IR SCREENING, M76



ARD 2609

Type Classification:

Std. LCC-A, MSR 05856004

Use:

Used with the M250, M239, M243 and similar grenade launchers to provide an infrared and visual smoke screening capability for armored/tactical vehicles.

Description:

The grenade consists of a plastic cylindrical main body that contains the IR composition, burster, booster lead, and safe and arm (S&A) mechanism. The S&A mechanism consists of a out-of-line spring loaded slider/bore rider containing the explosive lead and a spring loaded setback lock. A propellant assembly is retained in the body forming the complete grenade. The propellant assembly consists of a pyrotechnic delay detonator, launch propellant, an electric match, and a propellant retainer with electrical contacts.

Tabulated Data:

Model-----	M76
Type-----	Smoke, IR screening
Weight-----	4.0 lb (1.8 Kg)
Diameter-----	2.59 in.
Length-----	9.3 in.
Filler-----	3.1 lb (1.4 Kg)
	IR composition
Type-----	Electrical igniting
Replaced item-----	None

Federal Supply Code:

NSN-----	1330-01-171-8869
DODAC-----	1330-G826
Line Item Number-----	G80205
Class of Supply-----	V

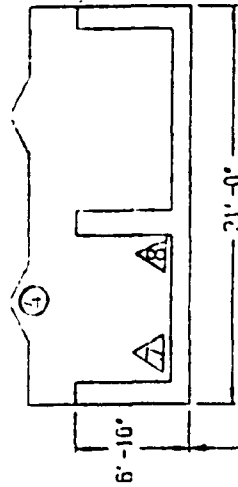
See DoD Consolidated Ammunition Catalog for additional data.

Change 8 5-9

BUILDING 626

BUILDING 626 WAS DESIGNED AS A RAMPAGE FOR THE BUILDING VACUUM SYSTEM. THE ROOF, THE SOUTH WALL, THE CENTER WALL, AND BOTH END WALLS ARE REINFORCED CONCRETE. THE FRONT PORTION OF THIS BUILDING IS CONSTRUCTED WITH STEEL FRAMING AND COVERED WITH CORR ASBESTOS.

BUILDING 626



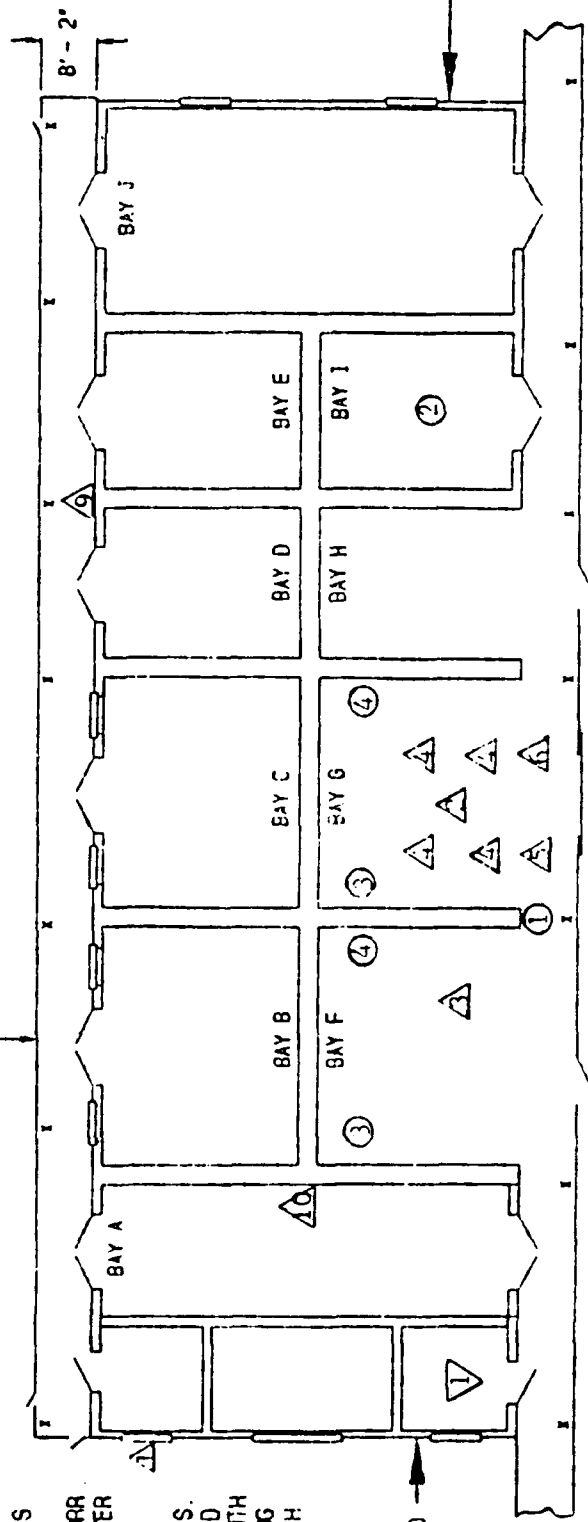
- ① Preparation of Test Site
- ② Receipt of Test Ammunition
- ③ Continuity Verification Test
- ④ Operation Shield Test

- △ Instrumentation Van
- △ APE 1974E002
- △ APE 1980
- △ Side-on Pressure Transducers
- △ High Speed Camera
- △ Television Camera
- △ Television Monitor
- △ APE 1963
- △ APE 1953
- △ Siren

BUILDING 628

THE INTERIOR WALLS ARE 12 INCH REINFORCED CONCRETE. THE OUTER WALLS ARE HOLLOW TILE. THE ROOF IS 7/16 INCH CORR ASBESTOS. THE CORR ASBESTOS ROOF OVER BAY G HAS BEEN REPLACED WITH FIBERGLASS PANELS. THE RAMP LOCATED ON NORTH AND SOUTH SIDES OF BUILDING ARE ENCLOSED WITH CONCRETE BLOCKS.

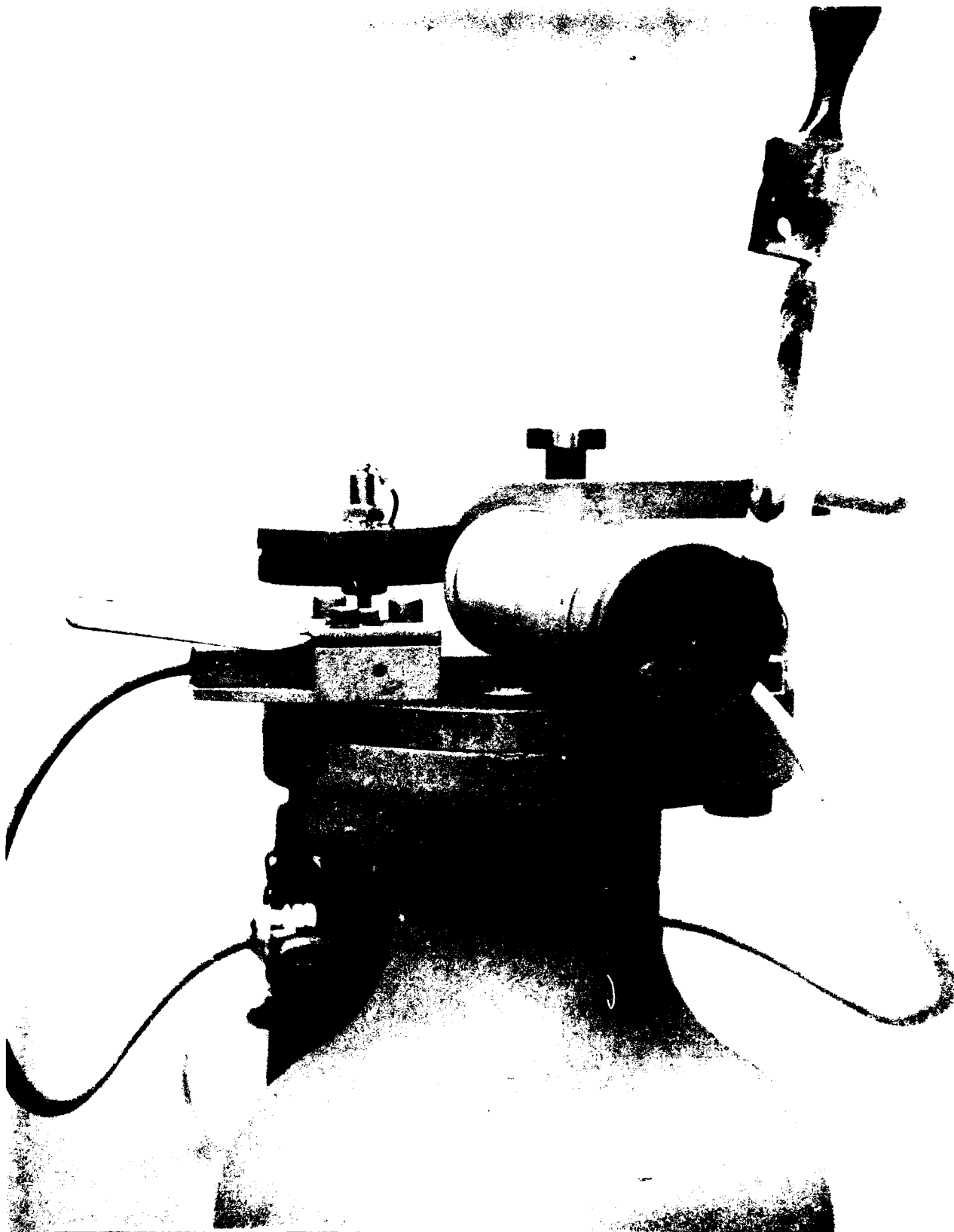
- ▽ Temporary Storage-Partially Fired Grenades



BUILDING 628

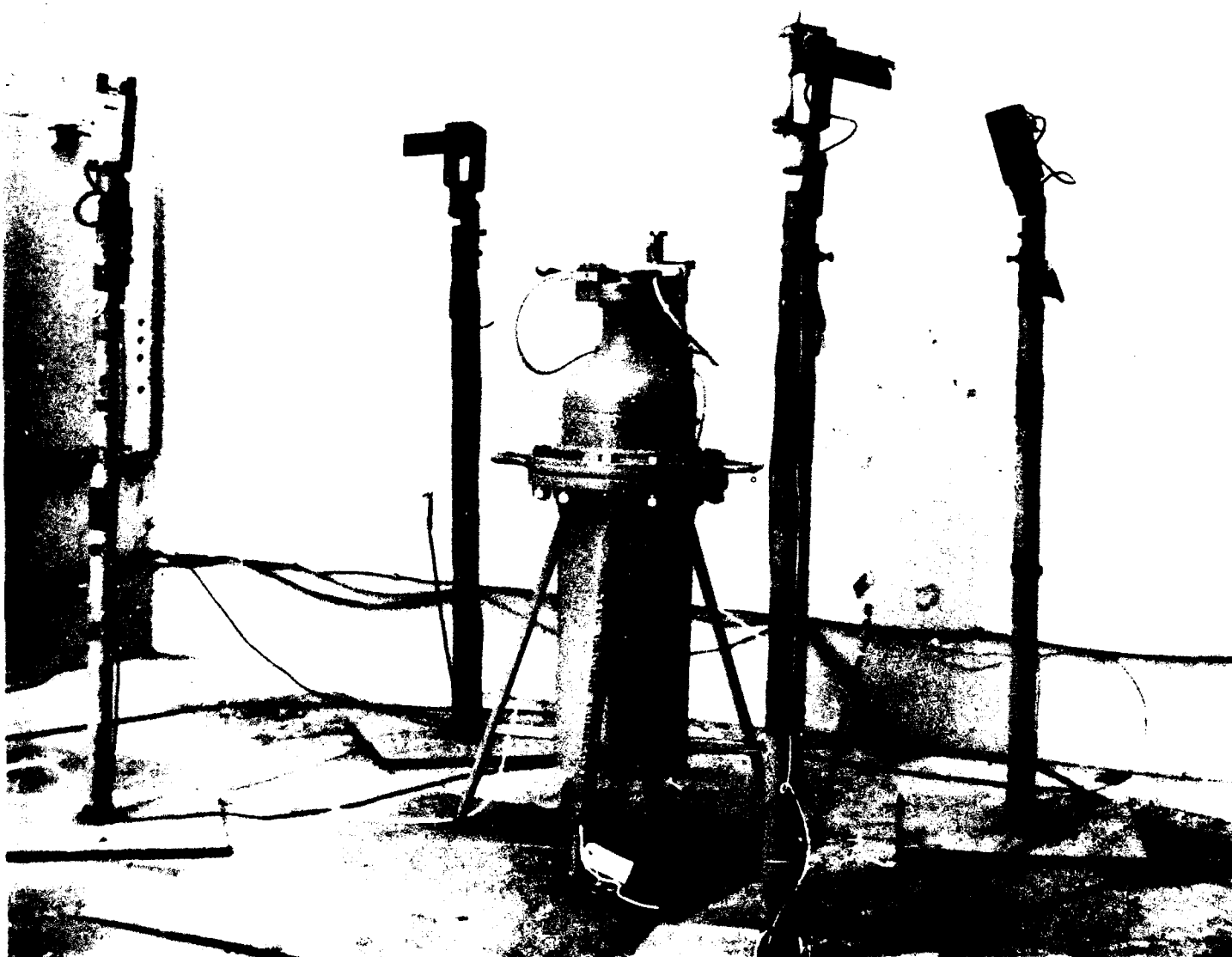
FIGURE 1 - LINE LAYOUT FOR SOP AC-6826-M-011

PART 7
PHOTOGRAPHS



DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

Photo No 1 (90-1354) This photo shows the IR Smoke Grenade after firing the explosive charge in the APE 1974 with the F002 adapter. The grenade functioned with a 25 percent overcharge of black powder.



DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL

Photo No. 2 (96-1357). This photo shows the APF 1974P902 position in the MHSB test bay located in building 628, Savannah Army Depot. The test specimen is surrounded by four stands supporting blast overpressure and thermal flux transducers. The stands are placed at locations where equipment operators are expected to stand while operating the equipment.